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Compiled by E. Thomas
Edited by P. Mittelman
H. H. Goldsmith

LIST OF HIGH ENERGY INSTALLATIONS

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First Edition
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TABLE OF CONTENTS

Introduction v
Key to abbreviations vi

Bibliography

General 1
Betatron 3
Cyclotron 9
Electrostatic accelerator 17
Frequency modulated cyclotron 27
Linear accelerator 30
Proton synchrotron 33
Synchrotron 33

Ion sources 38
Miscellaneous 43

List of High Energy Installations

In the United States 47
Outside the United States 52

INTRODUCTION

The bibliography in this publication comprises the literature devoted to the principal types of particle accelerators for the period 1930 through June, 1948. It originated as a brief bibliography compiled during the summer of 1947 by R. S. Rochlin of Cornell University. At the suggestion of M. S. Livingston, then chairman of the Accelerator Project of Brookhaven National Laboratory, the bibliography was expanded and carefully revised by the present authors. The references searched in this compilation include:

Chemical Abstracts, 1930 to date
Science Abstracts, Sections A and B, 1930 to date
A. E. C. List of Declassified Documents, July 15, 1946, to December, 1947
Guide to Published Research on Atomic Energy, November, 1946, to June 15, 1948, (discontinued)
Current journals not yet abstracted.

Many of the institutions now in the process of constructing accelerators are currently publishing progress and technical reports on their machines. No attempt has been made to record all such papers in this bibliography.

The list of high energy accelerator installations is based on a questionnaire which was sent to the major research institutes in the country. In this way, it was hoped, the errors which have studded previous compilations would be avoided. Despite this care, it is highly probable that errors still exist, especially in the listing of foreign installations.

Readers are earnestly requested to notify the compilers of any omissions or errors in either the bibliography or the list of accelerators. Further revised editions will be published as the need arises.

H. H. Goldsmith, Head,
Information and Publications Division

KEY TO ABBREVIATIONS

CA	Chemical Abstracts
SA	Science Abstracts, Section A (Physics)
SB	Science Abstracts, Section B (Electrical Engineering)
MDDC	Manhattan District Declassification Code

(A) Abstract (L) Letter (R) Review

Examples: CA 1946 4286^7 indicates an abstract appearing in position 7 in column 4286 of Chemical Abstracts for 1946; since 1947, letters have been used to designate column position.

SA 1948 346 indicates abstract 346 in Section A of Science Abstracts for 1948.

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LIST OF HIGH ENERGY INSTALLATIONS IN THE UNITED STATES

LOCATION	TYPE	DIMENSIONS[1]	PARTICLE[2]	ENERGY (Mev)
Argonne National Laboratory	Electrostatic*	-	-	4
	Cyclotron*	60 in	d	30
Arkansas, U. of	Electrostatic*	-	-	0.35
Bartol Research Foundation	Electrostatic	-	p	2
	Electrostatic*			10
	Linear Accelerator*	-	e	3
Biochemical Research Foundation (Newark, Del.)	Cyclotron	38 in	d	12
Brookhaven National Laboratory	Cyclotron*	60 in	d	30
	Electrostatic*	-	p	3.5
	Synchrotron*	30 ft	p	3,000
California Institute of Technology	Electrostatic	-	p,d	1.5
	Electrostatic	-	p,d	4
California, U. of (Berkeley)	Cyclotron	60 in	d	22
			α	44
	Synchro-cyclotron	184 in	d	190
			α	380
	Linear Accelerator	40 ft	p	32
	Electrostatic	-	p	4-5
	Synchrotron*	1 meter	e	300
	Synchrotron*	55 ft	p	6,000
California, U. of (U.C.L.A.) Los Angeles	Synchro-cyclotron	41 in	p	15
			d	7.5
Carnegie Institute of Technology	Synchro-cyclotron*	145 in	p	300
Carnegie Institution	Cyclotron	60 in	d	15
	Electrostatic	-	p,d	1
	Electrostatic	-	p,d	3.5
Case School of Applied Science	Betatron*	-	e	30
Catholic U.	Electrostatic	-	p,d	0.5

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* Proposed or under construction.

[1] The dimensions listed are the diameters of pole pieces in cyclotrons and synchro-cyclotrons, the orbit radii for synchrotrons, and the lengths for linear accelerators.

[2] p = protons; d = deuterons; e = electrons; α = alpha particles.

LOCATION	TYPE	DIMENSIONS[1]	PARTICLE[2]	ENERGY (Mev)
Chicago, U. of	Cyclotron	32½ in	d	8
	Synchro-cyclotron*	180 in	p	450
	Betatron*	-	e	180
	Betatron*	-	e	50
	Electrostatic	-	p, d	0.4
Columbia U.	Cyclotron	36 in	d	10
	Synchro-cyclotron*	164 in	p	400
Cornell U.	Linear Accelerator	-	-	0.5
	Cyclotron	15 in	d	1.5
			p	1
	Synchrotron*	1 meter	e	300
Duke U.	Electrostatic*	-	-	5
Florida, U. of	Electrostatic*	-	-	1
General Electric Co.	Synchrotron	-	e	80
	Synchrotron*	-	e	50
	Synchrotron* (non-ferromagnetic)	-	e	300
	Betatron	-	e	10
	Betatron*	-	e	13
	Betatron	-	e	50
	Betatron	-	e	100
	Resonance Transformer	-	e	2
Harvard U.	Synchro-cyclotron*	95 in	p	140
Illinois, U. of	Cyclotron	47 in	p	5
			d	10
	Betatron	-	e	4
	Betatron	-	e	22
	Betatron*	-	e	75
	Betatron*	-	e	300
Illinois, U. of, Medical School	Betatron*	-	e	22
Indiana U.	Cyclotron	45 in	p	5.5
			d	11.5
			α	23
Iowa State College	Synchrotron*	-	e	70

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[1] The dimensions listed are the diameters of pole pieces in cyclotrons and synchro-cyclotrons, the orbit radii for synchrotrons, and the lengths for linear accelerators.

[2] p = protons; d = deuterons; e = electrons; α = alpha particles.

LOCATION	TYPE	DIMENSIONS[1]	PARTICLE[2]	ENERGY (Mev)
Iowa U. of	Electrostatic	-	p,d	0.45
	Electrostatic*	-	p,d	5
Johns Hopkins U.	Electrostatic	-	p,d	1.5
	Electrostatic	-	p,d	5
Kansas, U. of	Electrostatic*	-	-	2.5
Kentucky, U. of	Electrostatic	-	p	1
Los Alamos Laboratory	Electrostatic	-	p	2.5
	Electrostatic*	-	p	12
	Cyclotron	42 in	p	10
	Betatron	-	e	20
	Electrostatic	-	d	0.2
Massachusetts Institute of Technology	Cyclotron	42 in	d	15
	Electrostatic	-	e,p	2.5
	Electrostatic	-	p	3-5
	Electrostatic	-	e	4
	Linear Accelerator	20 ft	e	20-30
	Synchrotron*	1 meter	-	300-400
	Electrostatic*	-	p	12
	Electrostatic*	-	-	1
	Electrostatic*	-	-	2
Michigan, U. of	Cyclotron	42 in	d	10
	Synchrotron*	1 meter	e	300
Minnesota, U. of	Electrostatic	-	p,d	4-5
Missouri, U. of	Electrostatic	-	-	0.4
National Bureau of Standards	Betatron*	-	-	100
	Betatron*	-	-	100
	Electrostatic	-	e,p	1.4
Naval Ordnance Laboratory	Betatron*	-	e	22
Naval Research Laboratory	Betatron	-	e	4
	Betatron	-	e	22
	Electrostatic*	-	p,d	2
	Synchrotron*	-	e	75

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[2] p = protons; d = deuterons; e = electrons; α = alpha particles.

LOCATION	TYPE	DIMENSIONS[1]	PARTICLE[2]	ENERGY (Mev)
New York U.	Electrostatic	-	p, d	0.4
Notre Dame, U. of	Electrostatic	-	e	4
Ohio State U.	Cyclotron	42 in	d	10
			p	5
	Electrostatic*	-	-	4
	Betatron	-	e	4
Pennsylvania, U. of	Electrostatic*	-	p	2-3
	Betatron*	-	-	20
Picattiny Arsenal	Betatron	-	e	22
Pittsburgh, U. of	Cyclotron	47 in	p	9
			d	18
			α	36
Princeton U.	Synchro-cyclotron	35 in	p	18
Purdue, U. of	Cyclotron	37 in	d	10.5
			α	20
	Synchrotron*	-	e	300
	Linear Accelerator*	-	e	10
Rice Institute	Electrostatic	-	p, d	2
Rochester, U. of	Cyclotron	26 in	p	7
	Synchro-cyclotron*	130 in	p	250
Rock Island Arsenal	Betatron*	-	e	22
Stanford U.	Cyclotron	28 in	d	2.7
	Linear Accelerator*	-	e	1,000
Virginia, U. of	Linear Accelerator*	-	e, p	2-3
Washington U. (St. Louis)	Cyclotron	45 in	d	10.4
			α	20.8
Washington, U. of (Seattle)	Cyclotron*	60 in	-	-

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* Proposed or under construction.

[1] The dimensions listed are the diameters of pole pieces in cyclotrons and synchro-cyclotrons, the orbit radii for synchrotrons, and the lengths for linear accelerators.

[2] p = protons; d = deuterons; e = electrons; α = alpha particles.

LOCATION	TYPE	DIMENSIONS[1]	PARTICLE[2]	ENERGY (Mev)
Westinghouse Electric Co.	Electrostatic	-	-	4
	Linear Accelerator*	-	e	30
Wisconsin, U. of	Electrostatic	-	p,d	4
Yale U.	Cyclotron	28 in	d	4 (3.6)
	Linear Accelerator*	-	p	1
	Linear Accelerator*	-	e	30

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* Proposed or under construction.

[1] The dimensions listed are the diameters of pole pieces in cyclotrons and synchro-cyclotrons, the orbit radii for synchrotrons, and the lengths for linear accelerators.

[2] p = protons; d = deuterons; e = electrons; α = alpha particles.

LIST OF HIGH ENERGY INSTALLATIONS OUTSIDE THE UNITED STATES

LOCATION	TYPE	DIMENSIONS[1]	PARTICLE[2]	ENERGY (Mev)
AUSTRALIA				
Melbourne, U. of	Betatron	-	e	2.8
CANADA				
Atomic Energy Project, Chalk River (Ontario)	Electrostatic*	-	p, d	5
National Research Council of Canada, (Ottawa)	Electrostatic	-	d	0.6
DENMARK				
Institute of Theoretical Physics, Copenhagen	Cyclotron	36 in	d	9.5
	Electrostatic	-	p	1
	Electrostatic	-	p	1
FRANCE				
Atomic Energy Commission, Fort de Chattillon, Fontenay Aux-Roses (Seine)	Cyclotron*	63 in	d	26
	Electrostatic*	-	p	5
Collège de France, Paris	Cyclotron	31 in	d	7.5
Ecole Normale, Paris	Betatron*	-	-	2
	Betatron*	-	-	20
Laboratoire de Synthese Atomique, Ivry (Seine)	Electrostatic	-	-	0.8
	Electrostatic	-	-	0.6
	Electrostatic	-	-	3
Strasbourg, U. of	Electrostatic	-	-	1.5
GERMANY				
Bonn, U. of	Cyclotron	16 in	p	2
Danzig, U. of	Electrostatic	-	e	0.8
Heidelberg U.	Cyclotron	40 in	d	9
	Electrostatic	-	-	0.9
Kaiser Wilhelm Institut für Physik, Berlin-Dahlem	Electrostatic	-	p, d	1.5
Leipzig U.	Cyclotron	40 in	-	-
Lichterfeld-Ost, Berlin	Electrostatic	-	p, d	1
Megavolt Versuchsanstalt, Wrist	Betatron	-	e	15

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* Proposed or under construction.

[1] The dimensions listed are the diameters of pole pieces in cyclotrons and synchro-cyclotrons, the orbit radii for synchrotrons, and the lengths for linear accelerators.

[2] p = protons; d = deuterons; e = electrons; α = alpha particles.

LOCATION	TYPE	DIMENSIONS[1]	PARTICLE[2]	ENERGY (Mev)
RMANY (concl.)				
Rostock, U. of	Electrostatic	-	e	0.9
Siemens-Reiniger Corp., Erlangen	Betatron	-	e	6
	Betatron*	-	e	6
REAT BRITAIN				
Atomic Energy Research Establishment, Harwell	Synchro-cyclotron*	110 in	p	250
	Electrostatic*	-	p	5
	Electrostatic	-	d	0.2
Birmingham, U. of	Cyclotron (being redesigned as synchro-cyclotron)	60 in	d p	25 80
	Proton synchrotron*	15 ft	p	1,300
Bristol, U. of	Linear Accelerator*	-	e	100
Cambridge U.	Electrostatic*	-	-	5
	Cyclotron	37 in	d	7
	Electrostatic	-	p, d	1
	Electrostatic	-	p, d	2
Edinburgh U.	Electrostatic	-	-	1
Glasgow U.	Electrostatic	-	p	1
	Synchrotron	-	e	25
	Synchrotron*	-	e	300
Hammersmith Hospital, London	Electrostatic	-	p	2
Harwell (See Atomic Energy Research Establishment)				
Liverpool, U. of	Cyclotron	36 in	d	9
	Synchro-cyclotron*	140 in	p	300
London, U. of	Electrostatic*	-	p	2
	Electrostatic	-	d	0.5
Medical Research Council	Cyclotron*	60 in	d	25
	Betatron*	-	e	30
	Betatron*	-	e	30
Metropolitan-Vickers, Ltd., High Voltage Laboratory, Manchester	Betatron	-	e	20
	Betatron	-	e	30
Oxford U.	Electrostatic	-	p	1
	Betatron	-	e	17
	Synchrotron*	-	e	140
Telecommunications Research Establishment, Malvern	Synchrotron	-	e	15
	Synchrotron	-	e	30
	Linear Accelerator	-	e	4

Proposed or under construction.

The dimensions listed are the diameters of pole pieces in cyclotrons and synchro-cyclotrons, the orbit radii for synchrotrons, and the lengths for linear accelerators.

p = protons; d = deuterons; e = electrons; α = alpha particles.

LOCATION	TYPE	DIMENSIONS[1]	PARTICLE[2]	ENERGY (Mev)
ITALY				
Instituto Superiore di Sanita, Rome	Electrostatic	-	p,d	1
Padua, U. of	Electrostatic	-	p,d	1
JAPAN				
Institute of Physical and Chemical Research, Tokyo	Cyclotron	26 in	Destroyed November, 1945	
	Cyclotron	60 in	Destroyed November, 1945	
NETHERLANDS				
Amsterdam, U. of, Research Institute for Nuclear Physics	Synchro-cyclotron*	65 in	d	28
Philips Corp., Eindhoven	Electrostatic	-	p,d	1
Groningen, U. of	Electrostatic	-	d	0.3
NORWAY				
Municipal Hospital, Bergen	Electrostatic	-	e	1.5
	Electrostatic*	-	p	1.5
	Synchrotron*	-	e	70-80
Oslo, U of	Electrostatic	-	p	0.55
	Electrostatic*	-	p	5
Technological U., Trondheim	Electrostatic*	-	-	5
RUSSIA				
Radium Institute, U.S.S.R. Academy of Sciences, Leningrad	Cyclotron	14 in	d	1.8
Physico-technical Institute, U.S.S.R. Academy of Sciences, Leningrad	Electrostatic	-	p	0.7
Physico-technical Institute, Ukrainian S.S.R. Academy of Sciences, Kharkov	Electrostatic	-	-	1
	Electrostatic	-	-	3
	Electrostatic	-	-	5
SOUTH AFRICA				
Johannesburg, U. of, Witwatersrand	Synchrotron	-	e	13

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[1] The dimensions listed are the diameters of pole pieces in cyclotrons and synchro-cyclotrons, the orbit radii for synchrotrons, and the lengths for linear accelerators.

[2] p = protons; d = deuterons; e = electrons; α = alpha particles.

LOCATION	TYPE	DIMENSIONS[1]	PARTICLE[2]	ENERGY (Mev)
SWEDEN				
National Defense Research Laboratory, Stockholm	Electrostatic*	-	-	1.8
Nobel Institute for Physics	Cyclotron*	84 in	d	26
	Electrostatic*	-	p	1.5
	Cyclotron	40 in	d	10
Stockholm, U. of	Electrostatic	-	-	-
	Electrostatic	-	-	-
Technological Institute, Stockholm	Betatron	-	e	4
	Synchrotron*	-	e	30
Upsalla	Synchro-cyclotron*	94 in	-	120
SWITZERLAND				
Basle, U. of	Electrostatic	-	d	0.2
	Electrostatic*	-	d	1
Brown Boveri Co., Baden	Betatron*	-	e	15
Eidgenössischen Technische Hochschule, Zurich	Cyclotron	38 in	p	7.5
	Electrostatic	-	d	0.6
	Electrostatic	-	p	0.7

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[1] The dimensions listed are the diameters of pole pieces in cyclotrons and synchro-cyclotrons, the orbit radii for synchrotrons, and the lengths for linear accelerators.

[2] p = protons; d = deuterons; e = electrons; α = alpha particles.

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